CLAIMS

What is claimed is:

1. A device for short-cycle arc welding of elements, especially metal studs, to components, especially metal sheets, the device comprising:

a positioning mechanism that holds a welding head positionable relative to a component, the welding head having a chucking mechanism for holding an element, a linear motion mechanism for advancing and retracting the chucking mechanism relative to the welding head, and a feed channel for feeding elements to be welded into the chucking mechanism; and

the chucking mechanism includes radially movable chucking elements movable by a driven chucking means between an open position, which permits axial passage of an element from the feed channel through the chucking device, and a chucking position, in which an element is chucked between the chucking elements;

wherein the chucking mechanism in the open position forms a free passage for the elements to be welded that adjoins the feed channel and leads out of the welding head.

2. The device of claim 1, wherein the chucking mechanism comprises an axially movable clamping nosepiece that works together with the chucking elements to move them between the open and chucking positions.

3. The device of claim 2, further comprising a plurality of angled surfaces for coupling the clamping nosepiece and the chucking elements together in order to convert an axial displacement of the clamping nosepiece into one of a chucking and a release motion of the chucking elements.

4. The device of claim 2, wherein the clamping nosepiece further comprises an axially movable clamping nosepiece movable toward the feed channel in order to move into the chucking position.

5. The device of claim 2, further comprising a conically shaped inner surface positionable on a plurality of outer angled surfaces on the chucking elements, the inner surface acting with the clamping nosepiece.

6. The device of claim 2, wherein the chucking elements further comprise a plurality of self-centering chucking elements.

7. The device of claim 2, further comprising:

the chucking elements having an approximate wedge shape and being extendable toward the clamping nosepiece; and

a clamping nut locatable on a chucking element side facing away from the clamping nosepiece for movably retaining the chucking elements.

8. The device of claim 2, comprising a drive provided for bracing the clamping nosepiece against the chucking elements.

9. The device of claim 8, wherein the drive comprises a linear motor.

10. The device of claim 8, wherein the drive comprises a fluid cylinder.

11. The device of claim 8, comprising a motor drive, selectable as a linear motor, provided on the linear motion mechanism for each of advancing and retracting the chucking mechanism.

12. The device of claim 1, comprising a pressure sensor provided to monitor a pressure inside the clamping mechanism, a signal therefrom being provided to an analysis unit for analysis in order to emit a signal that is characteristic of the feeding of an element to the component surface.

13. The device of claim 1, comprising a measurement voltage applicable between the chucking mechanism and the component, the measurement voltage suppliable to an analysis unit for analysis in order to emit a signal that is characteristic of the feeding of an element to the component surface.

14. The device of claim 1, comprising:

an intermediate storage; and

a storage device;

wherein the feed channel is coupled through the intermediate storage to the storage device, the storage device feeding the elements to be welded.

15. The device of claim 14, comprising a maximum distance of one meter separating the intermediate storage from the workpiece opening of the chucking mechanism.

16. The device of claim 14, comprising a maximum distance of 0.5 meters separating the intermediate storage from the workpiece opening of the chucking mechanism.

17. The device of claim 14, comprising:

a chamber of the intermediate storage for accommodating an element to be welded, the element having closed axial ends; and

a plurality of pneumatic closures operable to close the closed axial ends.

18. The device of claim 17, comprising at least one sensor for stud length detection provided in the chamber.

19. The device of claim 17, comprising a feed line for feeding a gas into the chamber and an exhaust line for removing the gas from the chamber, each of which is controllable by a valve open onto the chamber.

20. A method for short-cycle arc welding of elements, including metal studs, to components, including metal sheets, the method comprising the steps of:

conveying an element to be welded through a feed channel to a surface of the component;

chucking the element after reaching the surface of the component; and

welding the element to the component.

21. The method in accordance with claim 20, comprising:

conveying the element through a chucking mechanism to the component surface; and

chucking the element through a chucking motion in the chucking mechanism directed away from the component surface.

22. The method in accordance with claim 20, comprising:

conveying the element to the component surface by a gas pressure through a feed channel opening into the chucking mechanism; and

chucking the element while the gas pressure is maintained.

23. The method in accordance with claim 22, comprising:

monitoring the gas pressure in the vicinity of the opening of the feed channel into the chucking mechanism during a feed process in order to detect feeding and presence at the component surface of an element to be welded; and

analyzing the gas pressure in the vicinity of the opening of the feed channel into the chucking mechanism during the feed process in order to detect feeding and presence at the component surface of the element to be welded.

24. The method of claim 23, comprising applying a measurement voltage between the chucking mechanism and the component that is analyzed to detect feeding and presence at the component surface of the element to be welded.

25. The method of claim 20, comprising holding the element to be welded in a mechanically clamped chuck during the welding process.

26. The method of claim 25, comprising subjecting the chuck to a testing force after completion of the welding process.

27. An arc welding system comprising:

a welding head positionable relative to a workpiece, the welding head having a chucking mechanism engageably holding an element, a first linear motion mechanism operable to radially open and close the chucking mechanism, and a second linear motion mechanism operable to advance and retract the chucking mechanism relative to the welding head;

the chucking mechanism including a plurality of radially movable chucking elements, each radially displaceable in response to an axial displacement of the first linear motion mechanism between an open position, permitting free axial passage of the element through the chucking device, and a chucking position, having the element chucked between the chucking elements;

wherein after the element passes freely through the chucking device and contacts the workpiece, and the first linear motion mechanism displaces in a first axial direction to position the chucking elements in the chucking position, the second linear motion mechanism subsequently displaces longitudinally in a second axial direction toward the workpiece, opposite the first axial direction, and advances the element for welding.

28. The arc welding system of Claim 27, comprising a conical nosepiece connectable to the first linear motion mechanism, the conical nosepiece positionable to directly contact the chucking elements to radially displace the chucking elements upon displacement of the first linear motion mechanism in the first direction.

29. An arc welding machine, comprising:

a welding head having a chucking mechanism operably holding one of a plurality of elements to be welded, a first motion mechanism operable to radially open and close the chucking mechanism, and a second motion mechanism operably advancing and retracting the chucking mechanism relative to the welding head;

a positioning mechanism remote from the welding head to position the welding head;

a linkage member joining the welding head to the positioning mechanism;

a storage chamber supportable by the linkage member operable to temporarily store individual ones of the elements to be welded; and

a feed channel providing an open passageway for the element through the welding head when the chucking mechanism is in an open position, the feed channel being in communication with the storage chamber.

30. The machine of Claim 29, comprising a storage device positionable remote from both the welding head and the storage chamber, the storage device operable to store for transfer to the storage chamber the elements to be welded.

31. The machine of Claim 30, comprising a feed line linking the storage device to the storage chamber.

32. A welding head for engaging individual items, the welding head comprising:

a chucking mechanism operable to hold one of the items, the chucking mechanism including a plurality of radially movable chucking elements;

a first mechanism operable to radially open and close the chucking mechanism;

a substantially conical-shaped nosepiece connectable to the first mechanism, the nosepiece positionable in direct contact with the chucking elements to radially displace the chucking elements;

a second mechanism operable to longitudinally advance and retract the chucking mechanism; and

a feed channel disposed through the welding head to deliver items for welding to the chucking mechanism.

33. The welding head of Claim 32, further comprising:

an inner cylinder connectable to the second mechanism;

an outer cylinder connectable to the first mechanism, the outer cylinder positioned external to the inner cylinder; and

at least one sleeve bearing positioned between the inner and outer cylinders to permit a sliding engagement of the inner cylinder and the outer cylinder.